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WATER THAT IS SAFE TO DRINK: ASSURE COMPLIANCE WITH DRINKING WATER STANDARDS

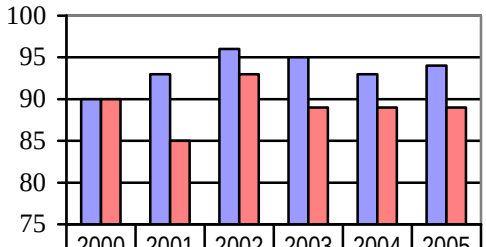
INDICATOR: PERCENTAGE COMPLIANCE WITH HEALTH-BASED STANDARDS (MCL AND TT) FOR SYSTEMS AND POPULATION SERVED

WHY IS THIS IMPORTANT?

The central goal of the Drinking Water Program is assuring that the water delivered to customers meets all health-based standards (defined as Maximum Contaminant Levels (MCLs) and Treatment Techniques (TTs). This indicator tells us whether we are achieving this central goal. The indicator looks at both the percentage of systems meeting all health based standards and the percentage of the population getting its water from systems meeting all health based standards.

HEALTH STANDARDS MET AT MOST DRINKING WATER SYSTEMS

Percent systems/population in full compliance with health based standards



	2000	2001	2002	2003	2004	2005
% systems	90	93	96	95	93	94
% population	90	85	93	89	89	89

HOW ARE WE DOING?

In state fiscal year 2005, 94% of all public water systems (1,601 of 1,704 PWSs) met all federal and state health-based standards. The performance and trends in this indicator are excellent.

The data for compliance as measured by percentage of total population served evidence the same trends. The community systems using surface water serve the largest populations and as they came into compliance with the Surface Water Treatment Rule and Lead and Copper Rule, overall compliance rates improved dramatically, as this data shows. The challenge in the coming years will be to maintain and even improve this performance as new standards are put in place.

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WATER THAT IS SAFE TO DRINK: IDENTIFY AND PROTECT FUTURE SOURCES OF DRINKING WATER

WHY IS THIS IMPORTANT?

INDICATOR UNDER DEVELOPMENT

LAND USE DEVELOPMENT CHOICES AFFECT FUTURE DEVELOPMENT OF DRINKING WATER SOURCES

As the source water assessments MassDEP has conducted demonstrate, some residential and commercial development choices are inconsistent with strong protection of surface and groundwater supplies of water. This development creates potential for contamination of water, and can also reduce the volume of water that can safely be withdrawn for human use. We have also seen that cleaning up contamination after the fact is very expensive and sometimes nearly impossible. Preventing harm is easier and cheaper, but requires planning ahead. It is important that as we are consuming land at an increasing rate that we know where potential sources of drinking water are located, and that we take action now to protect those areas, so that clean drinking water can be available for ourselves and future generations.

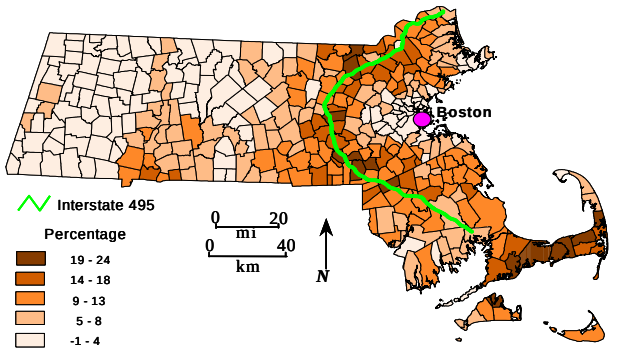

Figure 5. Map showing the percentage of land area, by town, converted from undeveloped land (crops, pastures, forests, open space) to developed land (residential, commercial, industrial land uses, etc.) from 1971 to 1999 (from MassGIS).

MAP FROM A PRESENTATION BY STEPHEN MABEE, MA STATE GEOLOGIST. USED WITH PERMISSION

HOW ARE WE DOING?

Massachusetts is consuming land at a fast pace – more than 40 acres per day according to one estimate. Unless this development is carefully planned, it could make potential sources of drinking water unavailable in the future, through incompatible land uses or release of contaminants. Massachusetts is now in the process of identifying potential sources of drinking water, so that development decisions can at least be made with knowledge of the risks and costs those choices will create. We are still in the beginning stages of this investigation, so do not yet have a measure of our success in protecting future sources of drinking water.

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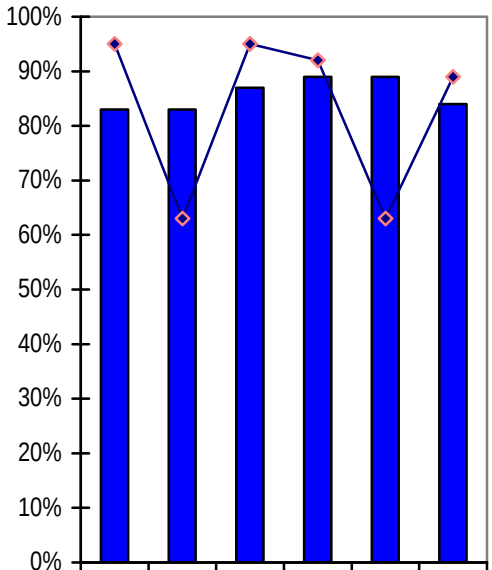
WATER THAT IS SAFE TO DRINK: KNOW IF DELIVERED WATER IS MEETING STANDARDS

INDICATOR: NUMBER OF PWS/POPULATION WITH NO VIOLATIONS OF MONITORING OR REPORTING REQUIREMENTS FOR HEALTH BASED STANDARDS

WHY IS THIS IMPORTANT?

WE HAVE GOOD DATA ON QUALITY OF DELIVERED DRINKING WATER

After protective standards are set, we need to make sure systems are testing their water and are reporting the results, so we can determine if the systems are complying with the standards. This indicator measures our public water suppliers' compliance with the monitoring and reporting rules. Without testing and reporting we don't know if the water is safe to drink, so this indicator measures performance that is critical to our ability to protect public health. This information also serves a secondary function of alerting us to compliance problems before they result in standard violations, allowing us to take action to prevent contamination before it occurs.



	2000	2001	2002	2003	2004	2005
% of COM systems in full compliance	83%	83%	87%	89%	89%	84%
% of pop served by systems in full compliance	95%	63%	95%	92%	63%	89%

HOW ARE WE DOING?

The percentage of systems that are fully complying with all of their monitoring and reporting obligations had been consistently improving but Stage 1 DBPR monitoring at smaller systems and monitoring ahead of the introduction of the lower arsenic MCL have contributed to a slight reduction in 2005. Performance reflected in the percentage of the population receiving water from systems that are in full compliance with reporting and monitoring requirements is more uneven. This difference reflects the fact that some water suppliers serve a large number of people, so even one violation at a large system can have a dramatic effect on the indicator when stated as a percentage of people served, rather than as a percentage of systems. In fact, the drop in the percent of population measured in 2001 and 2004 resulted from reporting violations at only two systems in each year. Both measurements are important, because we want to protect all of the people, but also want to improve performance of all the systems, including the ones serving a small number of people.

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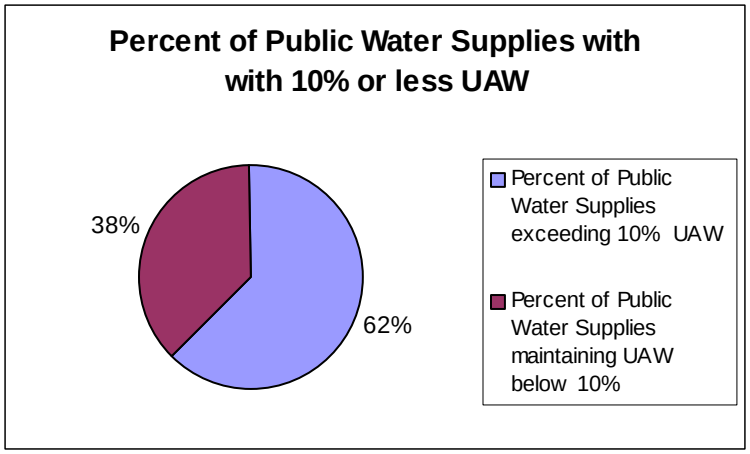
SUFFICIENT WATER FOR HEALTHY ECOSYSTEMS: Promote Wise Use of Water

INDICATOR:

- Percent of public water supplies meeting unaccounted for water standards (UAW)
- Percent of public water supplies meeting residential gallons per capita per day (RGPCD) water use standards



WHY IS THIS IMPORTANT?

These indicators will measure the success of public water systems in conserving water. If we use water wisely and minimize waste, we can meet the needs for drinking water and reduce the strain those uses put on our fresh water ecosystems.

Unaccounted For Water (UAW) includes the difference between water pumped or purchased and water that is metered or confidently estimated. Unaccounted for water includes water lost through water main joints and service connections, overflow of storage tanks, hydrant openings, leaks and other miscellaneous unmetered connections. To reduce unaccounted for water to less than 10%, the public water supplier (PWS) must make improvements to the water supply system that will reduce the volume of water withdrawn from the source(s) and minimize the environmental impact on the watershed.

For many public water suppliers, the majority of water used is to provide drinking water to residential users. By determining the number of residential users along with the volume of water pumped through residential meters within a specified time period (typically one year), a calculation can be made of the average daily volume of water utilized by residential users. The calculation for residential gallons per capita day (RGPCD) allows the PWS to evaluate efficiencies in consumer use. For those PWS that propose or have existing WMA permits, and who have withdrawals points located in watersheds determined to be High or Medium Stress, the current residential water use standard is sixty-five (65) RGPCD

HOW ARE WE DOING?

We currently do not have reliable data on the performance of water suppliers on unaccounted for water and residential gallons per capita per day. Some suppliers have not reported this information or have not provided data from which the answers can be calculated. Among suppliers who do report, the methods for calculation vary greatly, making it hard to rely on or compare reported values. We started in calendar year 2004 to implement new reporting standards that will allow us to track this information. As an interim measure, we tracked the number of WMA permits that contain requirements for RGPCD and UAW. We are now revising permits to include these conservation standards in high and medium stress basins. (See control water use – permitting.) Only 11% of the permits have been revised to date to include these conservation standards, but that percentage is increasing quickly.

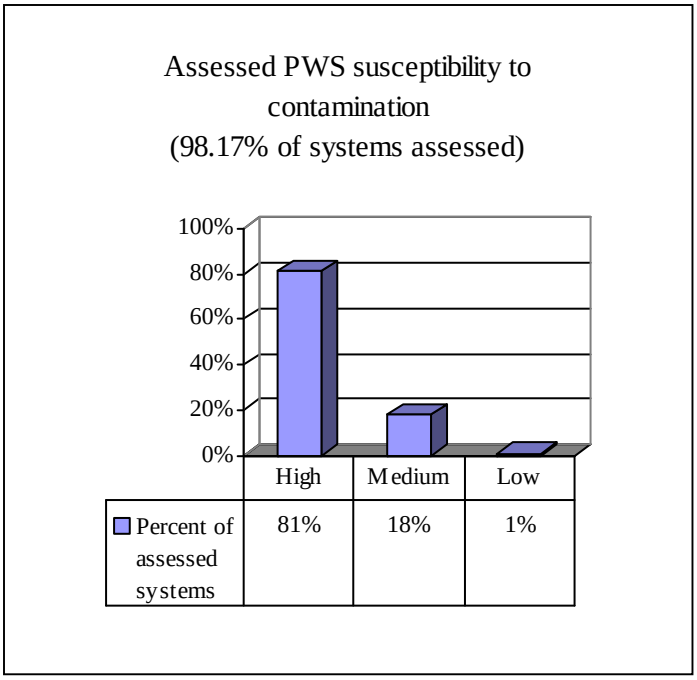
WATER THAT IS SAFE TO DRINK: PROTECT EXISTING SOURCES OF DRINKING WATER

Indicator: Number of systems with high susceptibility to contamination

MOST PUBLIC SYSTEMS HAVE A HIGH DEGREE OF SUSCEPTIBILITY TO CONTAMINATION

WHY IS THIS IMPORTANT?

One of the best ways to ensure that the water people drink is safe, is to protect the source of the drinking water from contaminants. This indicator measures systems where we have assessed susceptibility of the source to contamination. This measure is preventive in nature and seeks to reduce the threat of contamination.



HOW ARE WE DOING?

The first step in reducing contamination of source waters is to locate potential areas of susceptibility. Mass. DEP has completed Source Water Assessment and Protection Program (SWAP) mapping and reports for all public water systems. The reports were provided to each Public Water System and are posted on Mass. DEP's web site at: http://www.mass.gov/dep/water/drinking/swapreps.htm.

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The three most frequent high-ranked threats to groundwater are underground storage tanks, auto repair shops, and pesticide storage or use. The three most frequent high-ranked threats to surface water sources are transportation corridors, stormwater, and aquatic wildlife such as beaver.

Staff will continue to work with public water systems to reduce the risk of contamination by recommending the removal of potential threats, the development of local surface water and wellhead protection plans and the implementation of pro-active source protection measures. Much of this activity takes place during periodic Sanitary Surveys and site visits needed for other purposes.

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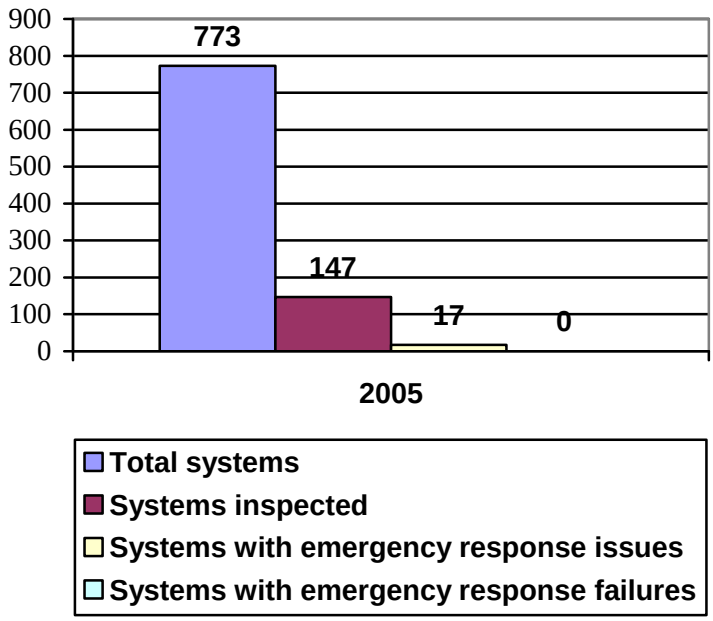
SUFFICIENT WATER FOR PUBLIC HEALTH AND SAFETY: ASSURE CAPACITY TO RESPOND TO EMERGENCIES

INDICATOR: NUMBER OF COMMUNITY AND NON-TRANSIENT NON-COMMUNITY SYSTEMS WITHOUT ADEQUATE CAPACITY TO RESPOND TO EMERGENCIES

WHY IS THIS IMPORTANT?

SOME SYSTEMS COULD BE BETTER PREPARED FOR EMERGENCIES



At some time, every public water system (PWS) experiences temporary situations that impair its ability to deliver either an adequate quantity of water, or water of a desired quality to a portion of its service area. Certain events can be anticipated and response systems implemented. Because public water supplies are important in protecting public health (clean water to drink) and safety (water for fire fighting), we require all PWS to have back up systems, emergency response plans and to meet other requirements to assure that they are prepared. A good emergency response plan is at the heart of a quick and adequate remedy on a temporary basis until the usual service is restored. Certain physical provisions should also be in place in every system to enable uninterrupted availability of safe water. These provisions may involve backup energy supplies, reserve sources of water, and a distribution system designed to bypass events such as a break in a water main. This indicator measures system preparedness for emergencies.

HOW ARE WE DOING?

Most systems inspected were prepared to respond to emergencies. 147 (19%) of all Community and NTNC systems were inspected in SFY 2005. Of the systems inspected, 88% were fully prepared to respond effectively to emergencies while 12% had some preparedness issues. These were primarily in the areas of emergency response plan deficiencies (such as inadequate plan, outdated plan, or no plan) and inadequate storage (not enough storage for emergencies that require large volumes of water, such as mains breaks and fire fighting, or in potential water quality problems such as open storage). Despite these capacity issues (which could mean that a system is not well prepared to respond to an emergency) the systems responded satisfactorily in all of the actual emergencies that arose.

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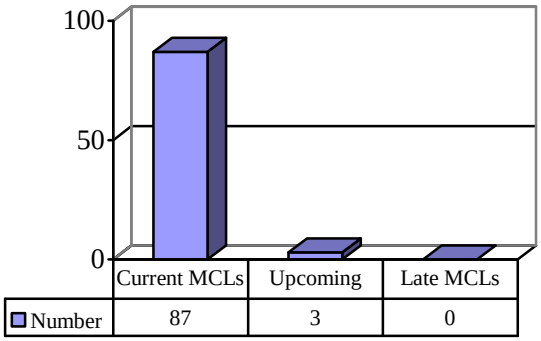
WATER THAT IS SAFE TO DRINK: SET STANDARDS FOR SAFE DRINKING WATER AT PUBLIC WATER SUPPLIES (PWS)

INDICATOR: ARE WE CURRENT WITH ALL STANDARDS AND RULES?

WHY IS THIS IMPORTANT?

Drinking water standards that reflect current knowledge about threats to public health are obviously a critical first step in assuring the safety of our public water supply. As new links between human health and substances present in drinking water are established, new standards are created to minimize the adverse effects of these substances. Both the U.S. Environmental Protection Agency (EPA) and the Massachusetts Department of Environmental Protection (MassDEP) maintain exacting standards. To protect public health in Massachusetts, we need to stay current and ensure that our state standards reflect current knowledge and federal rules for drinking water safety.

WE ARE CURRENT WITH ALL DRINKING WATER STANDARDS AND RULES



HOW ARE WE DOING?

Massachusetts is current with adoption of all federal drinking water standards and is on schedule to adopt new standards. Standards include treatment techniques. During the next two years several new rules will be implemented and several will be finalized. In 2006 Massachusetts will also make several minor regulation corrections previously adopted by EPA. Among those will be:

- Adoption of EPA's June 2004 list of minor corrections and typos for 5 rules.
- Stage 2 Disinfectants and Disinfection Byproducts Rule (final promulgation is anticipated January, 2006).
- Long Term 2 Enhanced Surface Water Treatment Rule (final promulgation is anticipated January, 2006).
- Groundwater Rule (EPA's proposed rule has yet to be finalized, estimated to occur in the Spring of 2006).
- EPA is in the process of reviewing the Lead and Copper Rule and may propose changes.
- MassDEP is in the process of determining whether a Perchlorate maximum contaminant level is necessary.

For detailed information on these rules as well as the number of systems that will be affected statewide please see workplan.

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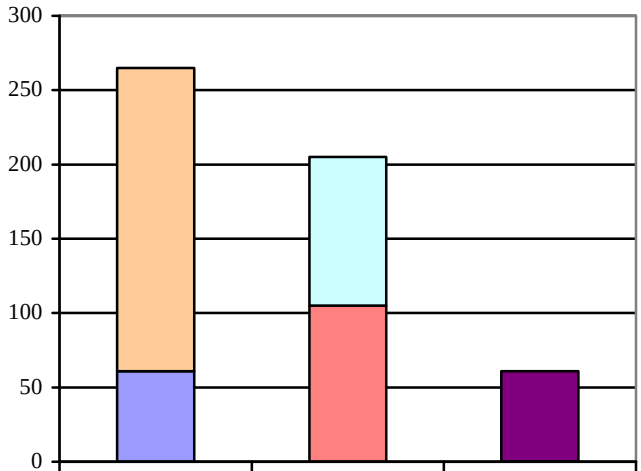
WATER THAT IS SAFE TO DRINK: SUPPORT PRIVATE WATER SUPPLY SAFETY

INDICATOR: NUMBER OF TOWNS WHERE PRIVATE WATER SUPPLIES ARE USED THAT HAVE ADEQUATE PRIVATE WELL REGULATIONS IN PLACE.

WHY IS THIS IMPORTANT?

State regulations apply only to "public" water supplies, which are defined as supplies that serve 25 or more people or 15 or more service connections for more than 60 days per year. However, we are still concerned about protecting the health of people who use private water supplies for drinking. These systems are regulated only at the local level. Adequate local regulations are necessary for protecting the health of people dependent upon private drinking water sources.

SOME PRIVATE WATER SUPPLIES USED FOR DRINKING WATER LACK ADEQUATE REGULATION



	Towns with private wells	Towns with bylaws	Towns still needing bylaws
No regulation			61
Some regulation		100	
Comprehensive regulation		105	
Private and public supply	204		
Entirely private supply	61		

HOW ARE WE DOING?

Over 550,000 people in Massachusetts currently depend upon private sources for drinking water. These people reside in 265 of the 351 towns and cities in Massachusetts. Because private sources are regulated only at the local level and not by the state, protection of the health of private well users requires adequate local regulations. To support development of protective regulations and protection of health, MASSDEP has developed model regulations and information on recommended sampling and safety measures. However, currently 61 of the towns in which people that use private sources of drinking water reside lack any local regulations covering use and monitoring of private drinking water sources. Only 105 of the towns have comprehensive regulatory programs addressing location and construction of wells and quality and quantity of water. We do not have current data on the extent of contamination present in private drinking water wells, though a 1988 study showed contamination of "at least 636 private wells in 120

Massachusetts municipalities"[1]. MASSDEP programs to protect groundwater and prevent contamination of public drinking water supplies often also provide protective benefits to private wells. Although MASSDEP will continue its programs protecting groundwater and public water supplies, which benefit private well users, we will have to depend on local governments to look out for the health of people who drink water from private sources.

[1] Massachusetts Special Legislative Commission on Water Supply. April 1988, "Private Well Contamination in Massachusetts: Sources, Responses, and Needs."

SGW_Prevent Flow Degradation_Summ-06
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SUFFICIENT WATER FOR HEALTHY ECOSYSTEMS: Prevent Stream Flow Degradation

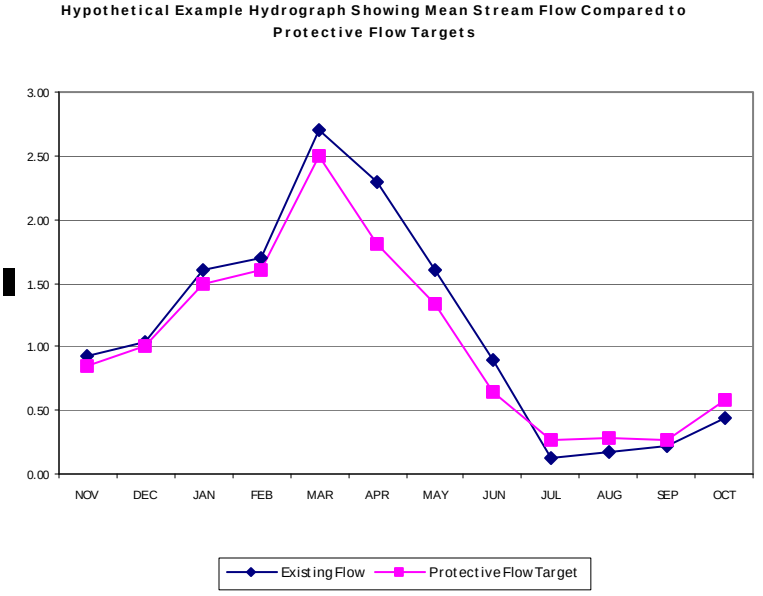
INDICATORS:

- Percent of streams meeting protective stream flow targets

WE DO NOT HAVE THIS DATA YET, BUT ARE WORKING ON DEVELOPING THE TARGETS AND MEASURING PROGRESS

WHY IS THIS IMPORTANT?

The best way to determine whether we have healthy stream flow is to compare actual flows to a desired standard. Although ultimately we want to improve conditions in areas that now fail to achieve a desired flow pattern, at a minimum we want to avoid making existing problems worse and to protect good conditions where those exist. We do not currently have either protective flow targets or data on actual flows in many watersheds, although we are in the process of developing protective flow targets and collecting stream flow data. As we develop this data, we will be able to use this indicator to measure our success in preventing conditions from getting worse, and work toward changing them for the better. This hydrograph presents a hypothetical example of the kind of data we are developing.



HOW ARE WE DOING?

At this point the Department does not have sufficient data to develop protective flow targets for most streams or to track extent of variability from the desired level to measure our success in preventing deterioration of flow levels. However, MASSDEP is taking action through its new Water Management Act permitting policy to prevent worsening of conditions by issuing permits with protective flow limits and reducing waste of water.

We are currently working on developing hydrographs and protective flow targets for stream flows. (See Set Protective Flow Targets.) When this work is complete, protective flow targets can be developed based on optimal flows identified. We can than compare the new protective flow targets to current flow conditions and determine where conditions are good and establish a baseline for determining if conditions are getting any worse. In the meantime we are using the U.S. Fish and Wildlife Service's Aquatic Base Flow as a trigger for water conservation measures. [0.5 CFSM for June – October].

Work in other areas of the Department is also contributing to prevention of flow degradation, by reducing water removed from basins through infiltration and inflow and increasing in basin recharge of wastewater and stormwater.

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CLEAN WATER: CONTROL POLLUTION FROM NONPOINT SOURCES

INDICATOR: UNDER DEVELOPMENT

WHY IS THIS IMPORTANT?

Indicator under development

Nonpoint source pollution or "polluted runoff" – which enters our water bodies from septic systems, agricultural uses and runoff from roads, parking lots, construction sites, lawns and other locations – is now the dominant cause of water quality problems to our lakes, rivers and coastal areas. Point sources still have significant impacts in certain water bodies, but across the state nonpoint source pollution affects more total miles and acres of water. Although these pollution sources are lumped under the single heading of nonpoint sources, in fact there are a huge variety of nonpoint sources from farms to parking lots, which result from a similarly wide range of activities, from cars with leaking oil to construction of new structures. This wide range of land-use activities and sources contributing to nonpoint source pollution, and our lack of data on total loading of pollutants from these many sources, make development of an indicator to measure our progress difficult, although control of nonpoint sources is clearly critical to improving the quality of our waters.

HOW ARE WE DOING?

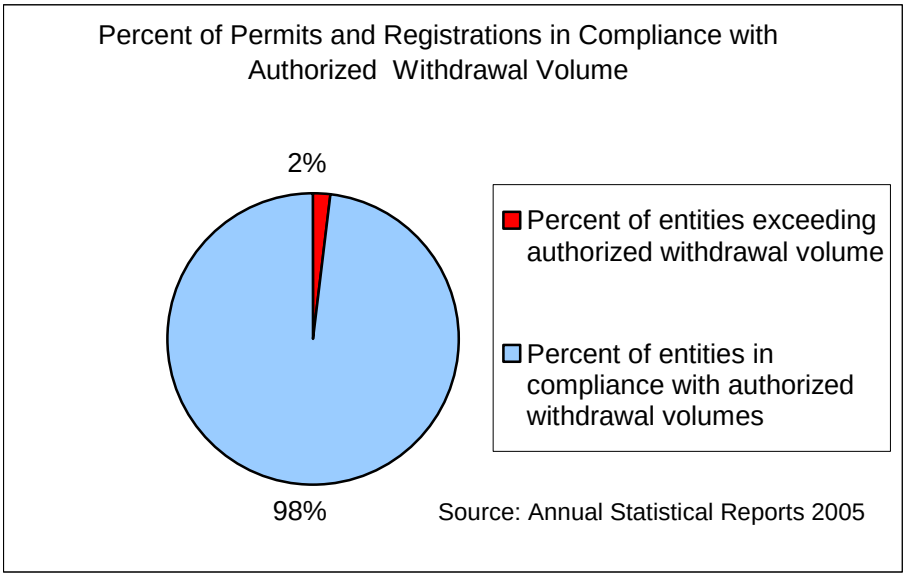
There are a number of on-going federal, state and local programs to reduce nonpoint source pollution, including new stormwater control requirements for many towns, reductions in illicit connections to our storm drains, and grants programs to implement practices to prevent and control polluted runoff and educate communities on the damage caused by the cumulative effects of many small sources of pollution. However, there are also disturbing negative trends, such as the dramatic increase in percent of impervious surface in the state, which increases stormwater runoff and pollution generally. Because we do not have comprehensive monitoring data for our state's water, particularly in headwater areas where the effects of nonpoint source pollution are likely to be greatest, and do not have meaningful water quality trends data, we cannot say with confidence how we are doing at controlling nonpoint sources of pollution.

SUFFICIENT WATER FOR HEALTHY ECOSYSTEMS: Control Water Withdrawals – Compliance

INDICATOR:

- Percent of permits and registrations in compliance with authorized water withdrawal volume limits

THE COMPLIANCE RECORD IS GOOD



WHY IS THIS IMPORTANT?

This indicator measures how well the regulated community is maintaining compliance with authorized withdrawal volumes. Permitted and registered withdrawals are only one of the factors that contribute to flow problems in Massachusetts' rivers. However, controlling withdrawals through registrations and permits is one way that MASSDEP protects the environment while we work to assure adequate water for human needs. Limits on withdrawals in permits and registration are only effective to the extent that we assure compliance with those limits. This indicator measures how good compliance with these limits is in the state.

HOW ARE WE DOING?

The large majority of the regulated community with registrations and/or permits is in compliance with withdrawal volume limits. More difficult to determine is the number of entities that should, but do not, have WMA permits and are therefore not limited in amount or timing of their withdrawals. To address this, the Department is taking action to identify water withdrawals subject to the Water Management Act and requiring a permit that have not applied for appropriate authorization.

Additional data indicate that there is no relationship between compliance or number of permits and registrations in a basin and the degree of basin stress. However, if the majority of the regulated community is in compliance, yet there is increasing stress observed in basins, this might indicate a need to revisit our controls on withdrawals and other activities that affect water flows (such as infiltration and inflow, location and manner of sewage disposal, etc.). In order to assess the impact the WMA has on managing water use, the program needs to improve reporting and data management to support the WMA as an instrument to achieve these goals.

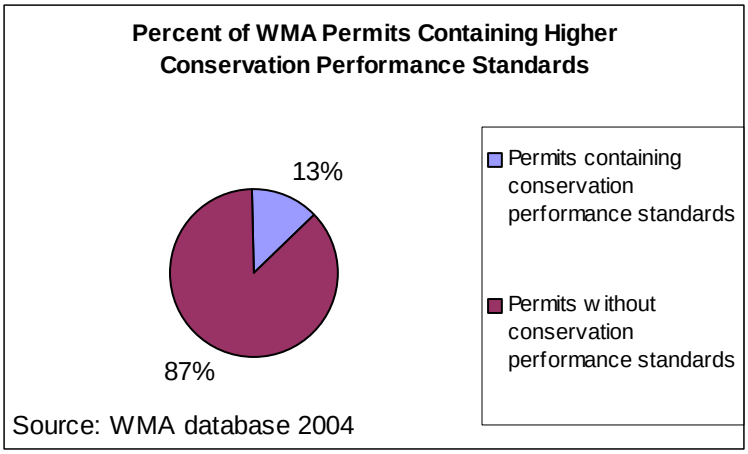
SUFFICIENT WATER FOR HEALTHY ECOSYSTEMS: CONTROL WATER WITHDRAWALS – PERMITTING

INDICATOR:

- Percent of permits containing conservation performance standards

WHY IS THIS IMPORTANT?

MORE PERMITS NEED PERFORMANCE STANDARDS



Stream flows are affected by many human activities, including wastewater disposal, leaking pipes, creation of impervious surface (that water cannot penetrate), dams and withdrawals. All of these factors are important and are addressed under a variety of programs within MASSDEP. The Water Management Act controls primarily withdrawals of water. While not the only factor that affects stream flows, proper control of withdrawals is a key component to protecting our rivers and streams and restoring flow impaired waters. Permitted withdrawals under the Water Management Act are approximately 15% of the total regulated volume of water withdrawn in the Commonwealth in an average year. Although permitted withdrawals are a limited part of the total problem, they are important and do provide a mechanism for not only holding the line against making any existing problems worse, but also starting toward significant improvements. This indicator measures how good a job MASSDEP is doing at controlling withdrawals through water management permits and requiring demand management practices to avoid wasting water, especially in basins that are already stressed.

This indicator measures those permits that include a performance standard requiring a PWS to meet residential gallons per capita day (RGPCD) limit of 65 and unaccounted – for-water (UAW) use of 10%. This performance standard currently appliers to all PWS in high and medium stress basins and water suppliers with Inter-Basin Transfer approvals issued by the Water Resources Commission.

HOW ARE WE DOING?

Currently, only 13% of the permits issued for water withdrawal include the higher-level conservation performance standard for RGPCD and UAW. While this number represents a fraction of all permits, these conditions have been placed predominately in high stress basins - where the need is the greatest. In addition to performance standards for UAW and RGPCD, permits in high and medium stress basins will also include conditions limiting non-essential outside water use and be required to evaluate the feasibility of mitigating any increase in authorized water use.

With the adoption of the new Water Management Permitting Policy in April 2004, we expect the number of permits containing performance standards and demand management controls to increase. The Policy describes the Department's work to review and condition permits relative to basin stress in order to protect aquatic habitat and ensure a stable water budget for all basins, especially those under high or medium stress. Implementation of this policy will dramatically increase the number of permits that have controls designed to prevent waste of our valuable water resources. In addition, all WMA permits are reviewed on a 5-year cycle. At the time of a permits 5-Year Review, we will amend permits that have water sources located in high and medium stress basins to include higher level performance standards.

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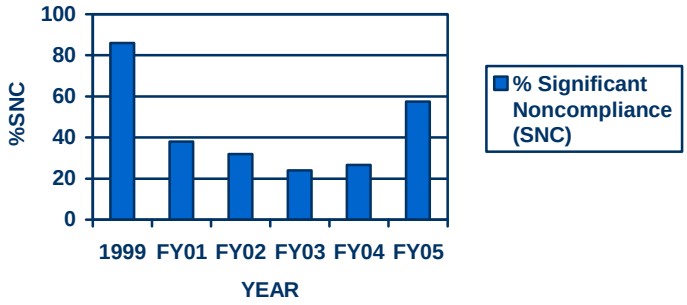
CLEAN WATER: CONTROL POLLUTION FROM POINT SOURCES-GROUNDWATER DISCHARGE PERMIT COMPLIANCE

INDICATOR: NUMBER/PERCENT OF DISCHARGES TO GROUND WATERS IN SIGNIFICANT NONCOMPLIANCE WITH PERMITS

WHY IS THIS IMPORTANT?

Permits designed to protect public health and the environment are only effective if the permittee complies with the limits imposed. Maintaining compliance with these permits helps assure that drinking water and surface waters are protected from pollution.

COMPLIANCE AT GROUNDWATER DISCHARGE FACILITIES IS IMPROVING



HOW ARE WE DOING?

In early 2000, an evaluation of the facilities regulated by the Groundwater Discharge Permit Program demonstrated that over 80% of the facilities were out of compliance with one or more program requirements. In response to this finding, the Department adopted a Comprehensive Compliance and Enforcement Strategy in Fiscal Year 2001. As a result, significant noncompliance rates have decreased to 23% up to Fiscal Year 2003. However, there has been an increase in both Fiscal Years 2004 and 2005. This is due to several factors, particularly the incorporation of monitoring well results into the database and the transition of enforcement reviews and enforcement action issuance from Boston to the regional offices. Other reasons include an increase in missing DMRs due to initiation of electronic reporting and the increase in data collected for each facility. Boston will continue to work with the regional offices to improve compliance.

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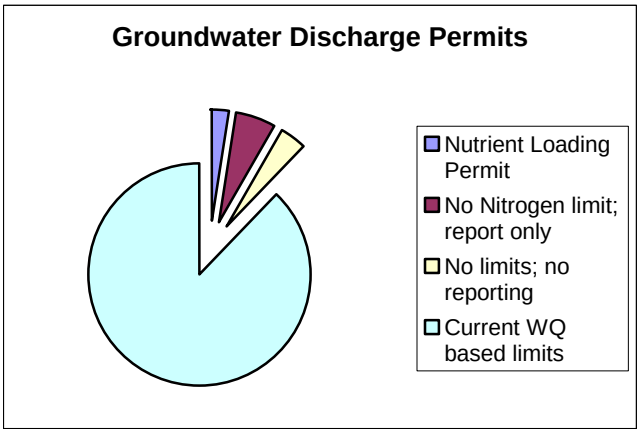
Control Pollution from Point Sources:
GROUNDWATER DISCHARGE PERMITTING

INDICATOR: NUMBER/PERCENT OF PERMITS WITH CURRENT WATER QUALITY BASED LIMITS

MOST GROUNDWATER DISCHARGE PERMITS HAVE CURRENT WATER QUALITY BASED LIMITS



WHY IS THIS IMPORTANT?

Discharges into groundwater have the potential to affect the quality of both drinking water and surface water. Permits for discharges into groundwater therefore must contain limits that protect groundwater quality. This indicator evaluates the number of groundwater discharge permits that have current water quality based effluent limits that protect groundwater.

HOW ARE WE DOING?

There are 238 permitted discharges to groundwater in the Commonwealth; 209 of these permits have limits that are protective of water quality. Of the 29 permits that do not have current water quality based limits, 6 are nutrient loading approach permits, 14 report nitrogen but have no limit, and 9 have no limits or monitoring requirements. Of course, even where permits are protective, they are only effective if the permittee complies with the limits, a measure that we also track. (See compliance with groundwater discharger permits). In addition, as we gain scientific knowledge about the contribution of groundwater to surface water quality we learn that permit limits we previously thought were protective may need to be revised. For example, the nutrient loading to many Massachusetts embayments and inland waters is approaching or has exceeded the limits of their ability to maintain ecological health. Based on the data collected to date, it appears that the primary cause of these eutrophication problems for marine waters is an overabundance of nitrogen and for inland waters is an overabundance of phosphorus discharged within the watersheds of these water bodies. Groundwater discharges are only one source of these pollutants, but we need to continually evaluate permit limits as our scientific knowledge advances.

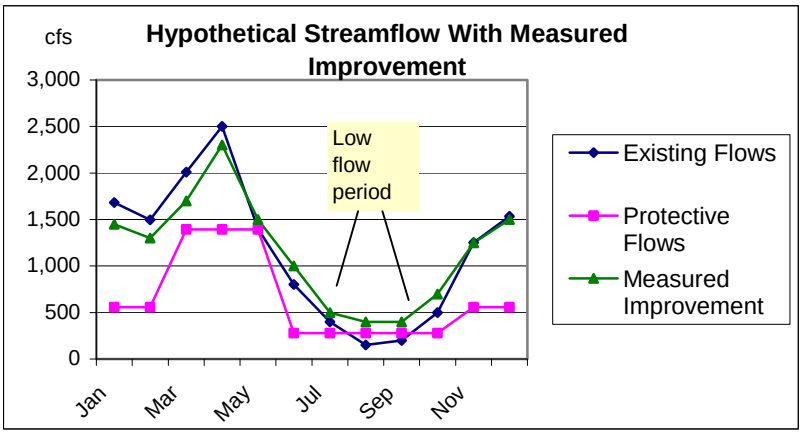
Sufficient water for Healthy Ecosystems: Improve Streamflow

Indicators:

- Measured streamflow improvements from existing flows toward targeted protective flows in stressed basins.

WHY IS THIS IMPORTANT?

WE DO NOT YET HAVE DATA FOR THIS INDICATOR



When fully developed, this indicator will measure our progress in improving conditions in basins experiencing stress from impaired flows. The analysis will include information on what activities contribute to the water imbalance and point to potential remedies. A successful program will make progress restoring impaired flows at the same time that we make sure we are providing enough clean water for public health and safety and economic development. The graphic presented here is a hypothetical example of the kind of data, and measurement of progress, that we hope to have in the future.

HOW ARE WE DOING?

We do not currently have data to measure performance on this indicator. We are working toward, but don't yet have, protective flow targets to serve as a baseline against which we can measure our progress.

Improving stream conditions will require evaluating results of water budget analysis and rethinking where and to what extent we withdraw water, dispose of wastewater, manage stormwater, develop land, and conserve water in order to maintain protective stream flows while we provided needed water for our use. The Department's approach to the use of water budget analysis procedure is still under development. Ultimately our goal is to improve those rivers and streams impacted by reduced flows as much as possible within the mandate of the Water Management Act (MGL 21G), which establishes " a mechanisms for managing ground and surface water in the commonwealth as a single hydrological system and ensuring, where necessary, a balance among competing water withdrawals and uses."

The Department is working to conserve water with the implementation of the Water Management Policy For Permit And Permit Amendment Applications And 5-Year

Reviews, Effective April 5, 2004 (WMA Policy #: BRP/DWM/DW/P04-1) This policy requires proposals for new or increased withdrawals in high and medium stressed basins to include an evaluation of water management strategies to offset proposed withdrawals by reducing out of basin flow or increasing water returned to the basin. (See Promote Wise Use of Water) We expect that the implementation of the policy will improve conditions by reducing overall water use in our stressed watersheds.

SGW_Know condition of ground and surface water_summ-06
FINAL October 2005

CLEAN WATER: KNOW CONDITION OF SURFACE AND GROUND WATERS

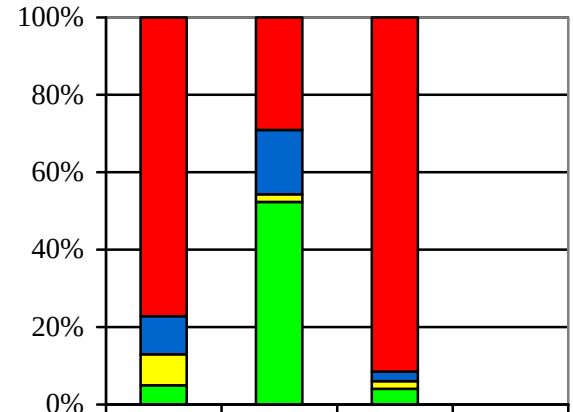
INDICATOR: PERCENT OF STATE'S WATERS ASSESSED AND WHERE CAUSE/SOURCE OF IMPAIRMENT IS KNOWN

WHY IS THIS IMPORTANT?

Monitoring the condition of our waters allows us to know where problems exist and, therefore, where we need to direct our attention. Sampling across the full spectrum of Massachusetts' waters helps us determine how widespread known problems are (e.g., nutrient pollution, mercury contamination) and also helps identify previously unknown problems. Sampling at the same locations over time tells us whether actions we take to address problems are working. Knowing that some waters are clean now helps us identify areas to preserve, so that we don't degrade existing high quality waters.

CONDITIONS AND SOURCES OF PROBLEMS NOT KNOWN FOR MOST WATERS

Percent waters assessed and source of impairment known



	Rivers	Lakes	Marine
Not assessed	77.3	29.5	91.2
Fully meeting assessed designated uses	9.8	16.8	2.5
Impaired - source known	8	2	2
Impaired -source not known	5	53	4

HOW ARE WE DOING?

We only conduct monitoring and perform assessments at a small portion of Massachusetts' surface waters now. To make the best use of our limited monitoring capacity we focus on areas where we strongly suspect problems may exist, which is primarily in larger rivers.

Our surface water monitoring program now rotates through a five-year cycle, so we sample in roughly 20% of the state's watersheds each year. Left unsampled are tributaries and smaller rivers and most of the state's marine areas (including estuaries, coastal areas where fresh and salt water meet, and near coastal waters). This level of monitoring has remained relatively constant over the last ten years.

Although we hope that we have identified the most severe problems, such a limited monitoring program cannot determine the full extent of our pollution issues nor can it identify the subbasins where problems are most acute. Attempts have been made to expand our information base by working with citizen volunteers and other entities interested in water quality and by finding other means to gather more information. Money spent to identify where problems occur and what is causing them will result in a more

cost-effective way to fix those problems in the long run because scarce dollars can be applied to the most important problems, with confidence that we have identified an effective solution.

In 2004 we conducted a needs analysis and developed a "Water Quality Monitoring Strategy for the Commonwealth of Massachusetts". The Plan discussed and evaluated different types of monitoring needed to fill important information gaps and identified resource gaps and monitoring priorities. The Strategy will be used to help support the need for additional monitoring personnel. The goal is to address the gaps within 10 years.

We do not currently have any comprehensive data on the condition of the state's groundwaters, although we do have data on a number of individual locations. Gathering this data to see what picture it presents of the state's groundwater quality is something we need to do as resources permit.

SGW_Know flow conditions_summ-06
FINAL October 2005

SUFFICIENT WATER FOR HEALTHY ECOSYSTEMS: Know Stream Flow Conditions

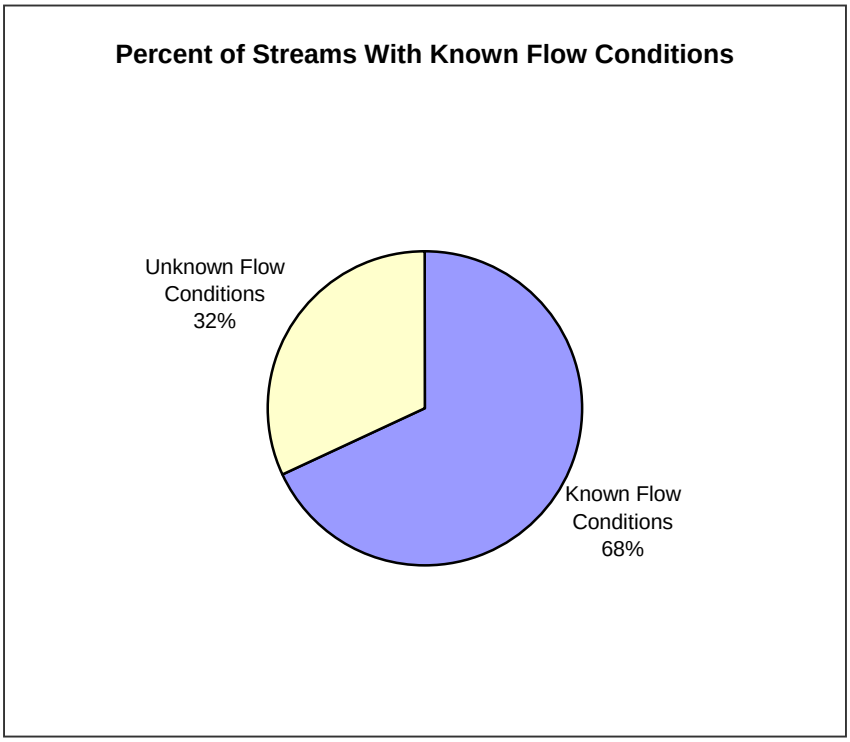
INDICATORS:

- PERCENT OF RIVERS FOR WHICH FLOW CONDITIONS ARE KNOWN

WHY IS THIS IMPORTANT?

Monitoring the flows in our waters allows us to know where flow problems exist and, therefore, where we need to direct our attention. Once we have protective flow targets or desired flow conditions established, these can be compared to data on actual flows to identify rivers where flow needs to be preserved and those that need to be improved.

FLOW CONDITIONS KNOWN IN MOST WATERSHEDS



HOW ARE WE DOING?

We have some flow condition information on 68% of our rivers. This data represents the drainage areas within Massachusetts where we have an understanding of the flow conditions at rivers and streams based on the Water Resources Commission's Stress Basin Report. Data from 72 gages, mostly along main stems, was used by the WRC in the Stressed Basin Classification Report to delineate hydrologic stress for river basins by comparing low flow statistics at gaged streams. The hydrologically stressed basins represent the rivers with the lowest flows (per square mile of drainage area) in Massachusetts. The WRC Report indicates that approximately 5% or 393 square miles of drainage area is classified as “high stress” for stream flow conditions; 35% or 898 square miles are under “medium stress”; 27% or 2207 square miles are under “low stress”; and 32% or 2594 square miles of drainage area are un-assessed for flow conditions.

Since we only have detailed flow data from gages on approximately 5% of the states named rivers, in the interim we are using the stressed basin classification as an indicator

of flow conditions in streams located within a particular stress classified subbasin. There are many limitations to using this information to evaluate stream flow conditions. The first is that it only measures a watershed relatively close to its largest point; while that means it includes inputs from throughout the watershed, it also cannot tell us where smaller contributing streams are experiencing flow impacts. Second, it tells us what a river's flow condition is relative to other rivers in the state, not how far or close it is to a healthy flow level.

In order to get a more accurate picture of stream flow conditions, the state needs to expand its network of stream gauges. (See Set Flow Standard.) This actual flow data can than be compared to a model hydrograph of optimal conditions to measure impacts and to identify where and at what times throughout the year mitigation is needed. These hydrographs, along with habitat assessments, can potentially indicate the degree to which flow regimes can be altered and still sustain a healthy ecosystem.

Currently, the United States Geological Survey (USGS) collects real-time flow data at 89 streams in Massachusetts. This flow data can be accessed at http://ma.water.usgs.gov/water_s.htm or http://waterdata.usgs.gov/ma/nwis/

SGW_PreventWQDegradation_summ-06
FINAL October 2005

CLEAN WATER: PREVENT DEGRADATION

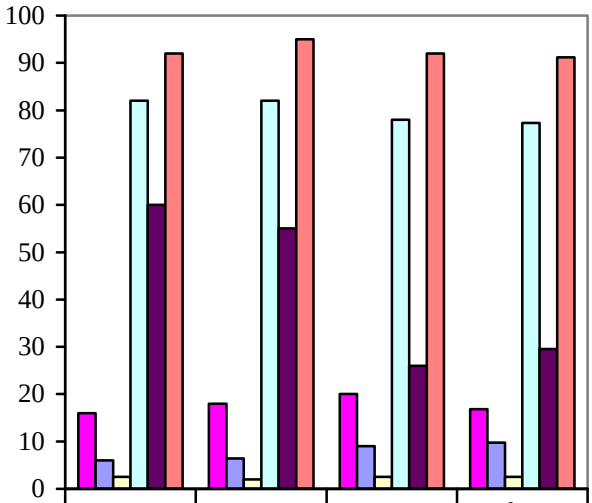
INDICATOR: PERCENT OF RIVERS, LAKES, AND MARINE WATERS THAT FULLY SUPPORT ALL DESIGNATED USES.

WE DO NOT HAVE ADEQUATE DATA TO PREDICT TRENDS IN WATER QUALITY STATEWIDE

WHY IS THIS IMPORTANT?

Massachusetts' lakes, rivers and coastal waters are valuable natural resources that provide habitat, recreation, fishing, and shellfishing. Our work to protect and improve water quality consists of two separate but related efforts: improving water quality where it is impaired and preventing good quality water from becoming impaired. It is easier and less costly to prevent problems from occurring than it is to fix them after they occur. For this reason, we need to maintain high quality waters. A good measure of our work to prevent degradation would be trends in the percent of waters that fully support all uses.

Percent of all waters fully meeting all designated uses and waters not assessed



	1998	2000	2002	Draft 2004
Lakes	16	18	20	16.8
Rivers	6	6.4	9	9.8
Marine	2.5	2	2.5	2.5
% of Rivers NOT Assessed	82	82	78	77.3
% of Lakes NOT Assessed	60	55	26	29.5
% of Marine Waters NOT	92	95	92	91.2

HOW ARE WE DOING?

Unfortunately, we do not know how we are doing at preventing water quality degradation because we do not assess most of the waters of the state. For waters not assessed, we do not know what percent are supporting all designated uses, or if that percentage is increasing or decreasing. Waters that are known to fully support designated uses are listed here but there are two important limitations to this information: 1) There likely are many more good quality waters that are not included in this data because those waters have not been assessed, and 2) no trend inference can be drawn from the data because the sampling is done for assessment purposes and not for determining trends. Also different basins are sampled in different years; so increases or decreases in percent of high quality waters reflect differences in basins, not change over time in the same locations. Although we do not have data sufficient to assess our progress toward this goal, we do have many programs that are designed to prevent degradation of our surface waters including, but not limited to: discharge permitting, stormwater controls, the River's Protection Act, designation of "Outstanding Resource Waters" to protect high quality waters, and 5) the State Septic System regulations (Title 5). In addition MASSDEP

maintains compliance and enforcement programs and grant and loan programs such as the State Revolving Fund and Nonpoint Source (section 319) grants.

These programs, in conjunction with the actions of the local boards of health, conservation commissions, lake and watershed associations, and others continue to prevent water quality degradation in the Commonwealth.

SGW_Restore Degraded WQ_summ-06
FINAL October 2005

CLEAN WATER: RESTORE DEGRADED WATER QUALITY

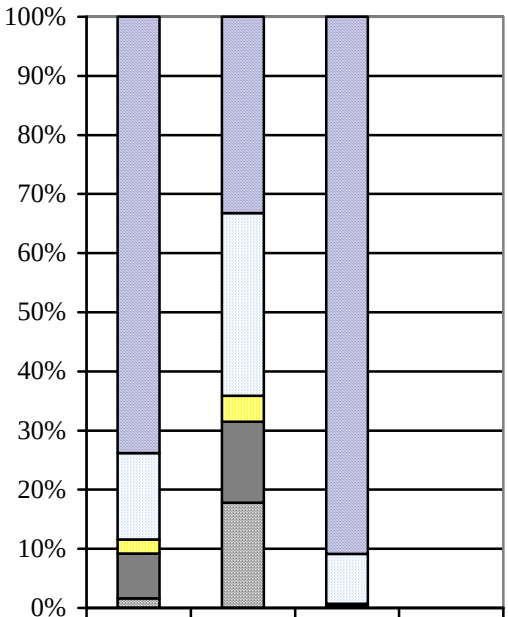
INDICATOR: PERCENT OF STATE'S IMPAIRED WATERS WHERE RESTORATION PLANS HAVE BEEN DEVELOPED OR ARE UNDERWAY

MANY MORE CLEAN UP PLANS NEEDED

WHY IS THIS IMPORTANT?

Measurably improved water quality is the target for our restoration work. However, because changes in water quality generally take some time, and because we do not have good trend data to use, for now we are using an intermediate measure as an indicator: the number of degraded waters for which we have done a clean up plan. Implementation of those plans, and measurable results in the state's waters, is our long-term goal.

Percent Waters Impaired, Where Plans Have Been Developed, and Where Plans are Underway



	Rivers	Lakes	Marine
Not assessed	73.8	33.2	91.2
Impaired w/Study Underway	14.6	30.9	8.5
Impaired w/Study Completed	2.4	4.4	0.2
Fully Meeting Designated Uses	7.6	13.7	0.4
Impaired Study Not Yet Started	1.6	17.8	0.1

For many of the degraded waters in the state we know what is causing the problem, e.g., low dissolved oxygen or excess nutrients. However, we have significantly less information on the sources that contribute to the problem, e.g., whether the excess nutrients come from sewage treatment plants, septic systems, stormwater, agriculture, etc. Before we can take action to reduce sources, we need to know what sources contribute. A study that identifies the sources and sets out a plan for reducing them is a necessary first step for improving water quality in many areas of the state. The level of information needed to formulate a restoration plan can vary greatly depending upon the pollutant of concern and number of sources. In some cases the restoration actions are fairly straightforward and consistent for types of waterbodies. In those cases it is more important to develop and implement corrective actions than to spend a lot of time collecting more data. In other cases a significant amount of analysis (monitoring and modeling) are needed prior to plan development to quantify each source identify their relative contribution.

HOW ARE WE DOING?

We have started developing restoration plans in a number of impaired waters throughout the Commonwealth although much more needs to be done. To date we have completed plans for 162 segments representing 194 water quality impairments and have a number of large studies underway including major efforts on Cape Cod through the Massachusetts Estuaries Project (MEP), the Nashua River and the development of a statewide bacteria TMDL that may address hundreds of segments in all 27 watersheds in MA. Implementation is also underway to decrease the amount of mercury emissions that have resulted in about 100 waterbodies in MA that have been identified as containing elevated levels in fish tissue. These actions are occurring not only in MA but also throughout New England and a number of Canadian Provinces. We are attempting to improve efficiency in producing better environmental results by grouping problems with similar causes and trying to deal with multiple waters at the same time. See work plan for more details. Since approximately 90% of the impaired waters in the state are impaired for either bacteria or nutrients, these issues are the primary priority for future plan development.

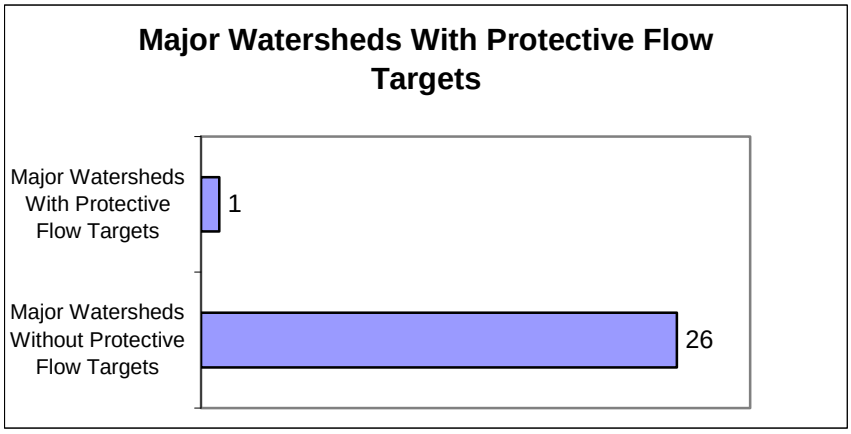
SGW_Set flow standard_summ-06
FINAL October 2005

SUFFICIENT WATER FOR HEALTHY ECOSYSTEMS: SET PROTECTIVE FLOW TARGETS

Indicator:

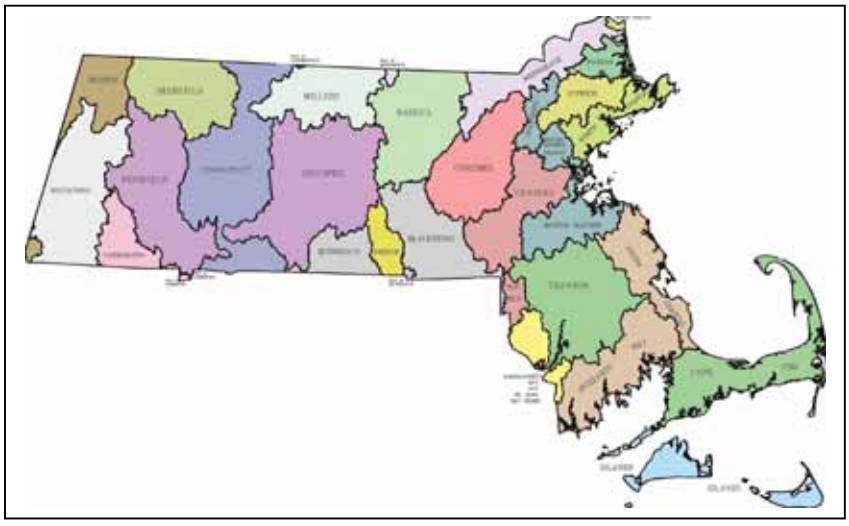
PERCENT OF MAJOR WATERSHEDS WITH PROTECTIVE STREAM FLOW TARGETS

PROTECTIVE STREAM FLOW TARGETS NOT YET ESTABLISHED



WHY IS THIS IMPORTANT?
Before we can take action to assure that we have a healthy ecosystem, we need to know what flow levels and patterns are necessary to protect our river ecosystems and establish protective flow targets to improve river ecosystem health. Protective flow targets can help protect already stressed water resources and can prevent deterioration of conditions in basins that are not yet stressed. This indicator measures the number of watersheds in which the main river has an individually established stream flow standard based on a desirable hydrograph that protects habitat. (Click here for sample hydrograph.)

Map of Major Watersheds



How are we doing?

Currently, no watershed has a protective flow target based on the natural hydrograph and habitat requirements. The Department is working collaboratively with other agencies to identify a model hydrograph that will depict a river's hydrograph that is sufficient to protect aquatic health. Once that information is available we can compare desired condition to the current observed hydrograph and identify where flow problems exist and where corrective actions might be possible.

In order to protect aquatic habitats, the Department has established an interim streamflow threshold that triggers mandatory restrictions on non-essential outside water use. Restrictions will be required when stream flow falls below the US Fish and Wildlife's

SGW_Set flow standard_summ-06
FINAL October 2005

New England Base Flow (ABF) default value of 0.5 cubic feet per second square mile (CFSM) for three consecutive days unless a site-specific study has established a more detailed flow statistic

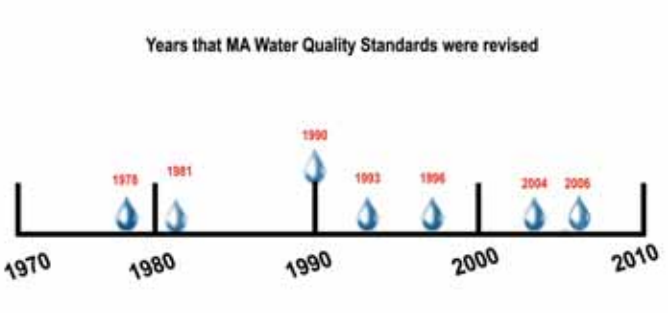
Water suppliers can check real time data on stream flows at the nearest gauge at the USGS website at http://waterdata.usgs.gov/nwis/.

CLEAN WATER: SET WATER QUALITY STANDARDS

INDICATOR: ARE WE CURRENT WITH WATER QUALITY STANDARDS?

WHY IS THIS IMPORTANT?

STANDARDS DELAYED, BUT STILL PROTECTIVE



Water quality standards define the quality that our waters have to meet to achieve the uses designated for each water body. All waters must have a goal of being of sufficient quality to be suitable for swimming and fishing. In addition to having swimming and fishing as designated uses, some waters are designated as drinking water and others as suitable for shell fishing. Having up to date standards helps us to ensure that our waters will be of sufficient quality do meet the designated uses and that our standards are protective of public health and aquatic habitat consistent with the latest science.

HOW ARE WE DOING?

EPA requires the states to review and update their Water Quality Standards (WQS) every three years. MASSDEP is not meeting this standard, and very few of the states in the country are. Although we are behind in our issuance of updated water quality standards, protective standards are already in place and our most recent review did not lead to any major changes in the standards. So although we did not meet the administrative requirement, we do not believe that the delay compromised water quality. However, a public process to review our water quality standards also provides a forum for public input into our standard setting process. Even when no significant changes result, the interaction with members of the public improves communication between MASSDEP and the public and obtaining public input is a key reason for reviewing the regulations on a regular basis.

SGW_SW Control point sources intro_summ-06
Final October 2005

CLEAN WATER: CONTROL POINT SOURCES

Point sources – sources of pollutants discharged at a particular point, typically a pipe – are one of the contributors of pollutants to our surface and groundwaters. One part of MASSDEP's job in protecting surface and groundwater is to make sure that these point sources have permits that adequately control pollution and that permitees comply with the permits. The indicators described below measure our progress in issuing protective permits and assuring compliance with permits for discharges to surface water and groundwater.

Links:

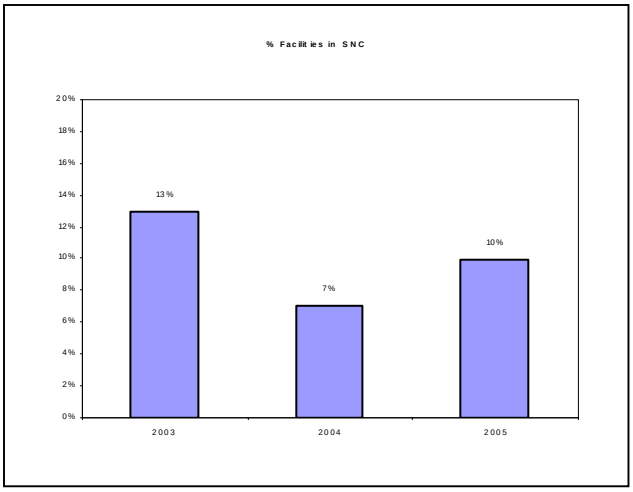
SW discharge permitting
SW discharge compliance
GW discharge permitting
GW discharge compliance

SGW_SW discharge compliance_summ-06
FINAL October 2005

CLEAN WATER: CONTROL POLLUTION FROM POINT SOURCES-SURFACE WATER DISCHARGE COMPLIANCE

INDICATORS: NUMBER/PERCENT OF DISCHARGES TO SURFACE WATERS IN SIGNIFICANT NONCOMPLIANCE WITH POINT SOURCE PERMITS

SIGNIFICANT NONCOMPLIANCE (SNC) AT SURFACE WATER DISCHARGE FACILITIES IS IMPROVING



WHY IS THIS IMPORTANT?

Compliance with technology and water quality based permit limits is essential to insure that point source pollutant loadings do not impair the designated uses of the receiving water and achieve the goals of the surface water quality standards. We monitor compliance with those limits to ensure that the intended protection is achieved. This indicator evaluates the number of surface water discharge facilities that are in significant violation of their permit limits, as a measure of how well we are doing obtaining compliance with the permits designed to protect surface water quality.

HOW ARE WE DOING?

In 2005 there were 29 NPDES facilities out of 292 in Significant Noncompliance with their permits compared to 23 of 324 in 2004 and 41 of 314 in 2003. Twenty-three of these facilities violated monthly average effluent limits and 6 violated other requirements such as non-monthly limits, report filings, compliance schedules and DMR data omissions. Enforcement orders with compliance schedules have been issued or are pending for all 23. The effluent parameters most frequently triggering SNC at the 23 facilities were: biochemical oxygen demand (BOD), total suspended solids (TSS), copper (Cu), aluminum (Al), and total phosphorus (TP). A more detailed accounting of the specific violations is provided in the Surface Water Discharge Compliance Work Plan. Copper is the most frequently violated parameter, because many current NPDES permits have very stringent compliance limits for copper based on EPA national criteria that are difficult for most facilities to achieve, in many cases lower than is necessary to protect water quality. MASSDEP has proposed to EPA State-wide site specific copper criteria and expects to adopt more accurate toxicity limits for copper that will continue to protect water quality without requiring unwarranted levels of investment by regulated entities in an attempt to achieve the limits. New site specific limits will significantly reduce the level of noncompliance while still protecting water quality. More troubling are the numbers of TSS and BOD violations associated with POTWs receiving more wastewater, as a result of excessive infiltration and inflow (I/I), than can be effectively managed. Discharge monitoring data from many POTWs indicate that mass loading limits for conventional pollutants such as BOD and TSS or percent removal criteria are

being violated during wet weather events. Plans to address these violations are set forth in the work plan.

SGW_SW discharge permitting_summ06
FINAL October 2005

CONTROL POLLUTION FROM POINT SOURCES: SURFACE WATER DISCHARGE PERMITTING

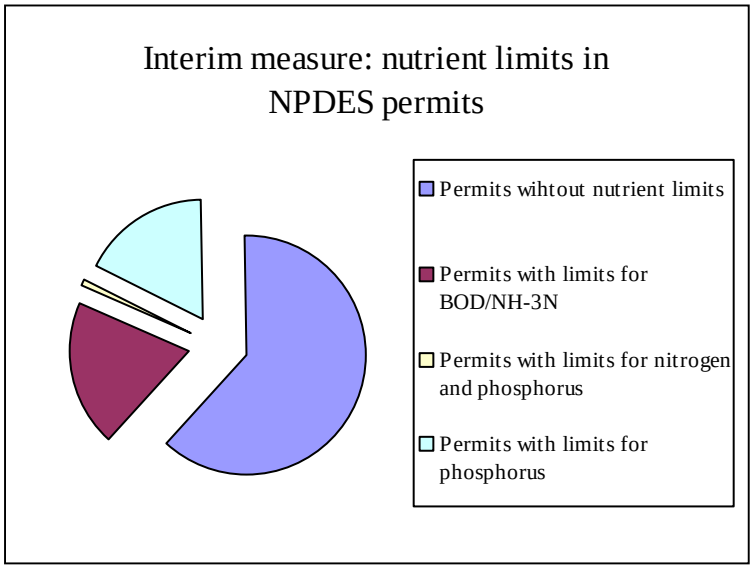
Indicators:

- NUMBER OF DISCHARGES CONTRIBUTING TO WATER IMPAIRED FOR NUTRIENTS
- NUMBER OF CSO AND STROMWATER DISCHARGES TO WATER IMPAIRED FOR BACTERIA

Why is this important?

Permits may not be sufficiently protective

Point sources are significant contributors to the pollution load in surface waters. At controlled levels, these pollutants can be discharged without harming our waters or the plants and animals that live there. The Surface Water Discharge Program helps to assure that our surface waters meet water quality standards and uses established by the Clean Water Act by controlling pollution from point sources. The effluent limits contained in surface water discharge permits are set to ensure such protection.



The two most significant causes of impaired water in Massachusetts are nutrients and pathogens. Therefore we need to measure whether we have adequately controlled surface water discharges by looking at the extent to which we control nutrient and bacteria inputs to surface water bodies. When fully developed, this indicator will evaluate the number of surface water discharge permits that are contributing to surface water bodies with identified impairments due to nutrients or bacteria. At the present time we do not have the data bases linked to geographic information systems to comprehensively determine which permits allow discharges to such impaired water bodies. As an interim measure we are tracking whether our permits contain limits for nutrients and bacteria.

How are we doing?

The 2002 Integrated List of Waters for Massachusetts identifies 683 surface water body segments as impaired. Nutrients and pathogens are the most prevalent causes of impairment. (The 2004 list is awaiting EPA approval) A preliminary analysis of the data indicates that at least 158 of NPDES/BRP permits authorize discharges to waters known to be impaired. This suggests the need to investigate further but does not by itself demonstrate that those permits are causing the water quality problem; many other factors contribute to water quality impairment, including nonpoint sources and physical

alterations. All BRP permits contain bacteria limits. With respect to nutrients, only 72 of the 158 permits include limits, which are known to be a significant cause of water quality problems. As is true of discharges to impaired waters, this alone does not demonstrate that the permit is not protective; the discharge may not contain excessive amounts of nutrients and/or the water body to which it discharges may not have nutrient problems. Further investigation is needed to determine which permits require tighter limits.

Combined Sewer Overflows (CSOs) occur in several watersheds across the Commonwealth. The discharge of untreated sewage associated with CSO events causes periodic (storm related) non-compliance with surface water quality standards for bacteria. Twenty-six communities have CSO systems, which impact Boston Harbor, Merrimack River, Nashua River, Connecticut River, Mount Hope Bay and New Bedford Harbor. All CSO discharges are covered under NPDES permits which require the implementation of "9 minimum controls" to reduce CSO impacts and the development of "Long Term Control Plans" (LTCPs). The elimination and/or treatment of CSO discharges over the past 20 years has significantly decreased the number of CSO events and volumes discharged by approximately 50%. The implementation of the "LTCPs" will produce additional reductions over the next 10-20 years, which cumulatively will reduce CSO volumes by over 75%.

Storm water discharges to surface waters cause water use impairments in water bodies across the state. The development of better storm water controls through the NPDES Storm Water Phase 2 program will lessen the impact to surface waters through better controls implemented at the local level. Quantification of water quality impacts from storm water and anticipated reductions through remediation are difficult to project so implementation aimed at lessening impacts to water quality is geared towards the development and implementation of "Best Management Plans" [BMPs] which can be assessed qualitatively as to their effectiveness over time.

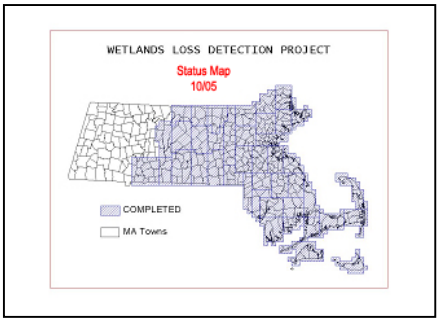
WW_ Identify causes of Wetland Loss-Summ-06
FINAL October 2005

PROTECT INTACT FUNCTIONING WETLANDS: DETERMINE EXTENT OF WETLAND LOSS

Indicator: Percent of state for which we have data on wetland loss

70% OF THE STATE ANALYZED FOR WETLAND LOSS

WHY IS THIS IMPORTANT?



Our main interest in protecting wetlands is to preserve the many functions that wetlands provide, including flood control, contaminant filtering, groundwater recharge and wildlife habitat. While many things can impair wetland functions, they lose all functions when they are filled. Determining the extent of wetland loss is therefore a critical first step in determining how our well our wetlands are functioning and what more we need to do to protect them.

HOW ARE WE DOING?

Using an innovative GIS based computer program and wetlands mapping data compiled over the past ten years, MassDEP's Wetlands Resource Mapping Project has accurately located and mapped wetlands. By comparing changes over time, these wetland maps can also depict those wetlands that have been filled. Through this effort, MassDEP is developing reliable and verifiable data on freshwater wetland loss. Analysis of the 2001 imagery determined that over 850 acres of wetlands within the study area (70% of the state) were filled between 1990 and 2001 (the span of years varies by area of the state; we do not have statewide map coverage for the same years). While this loss is a relatively small portion of the total wetlands in the state, it is far more than we would like, particularly in areas that already have significant historical wetlands losses.

Updates of the analysis of loss are continuing. New flights and photography were conducted in April of 2005 to identify wetland loss that occurred between 2001 and 2005. Imagery is being analyzed during the summer and fall of 2006. Preliminary image analysis of the 2005 information has found 725 sites where wetland loss occurred for a total of 214 acres within an area comprising approximately 80% of the Northeast and Southeast Regions. Further analysis including the first round aerial photo change analysis for the 30% of the state lacking previous flyover data is underway. Our goal is to obtain new data about every 2-3 years so we can keep a current tally on wetlands loss in the state.

PROTECT INTACT FUNCTIONING WETLANDS: IDENTIFY THE CAUSES OF WETLAND LOSS

INDICATOR: PRINCIPAL CAUSES OF WETLAND LOSS IDENTIFIED

WHY IS THIS IMPORTANT?

Knowing the principal causes of wetland loss will allow the Department to take action to reduce filling of wetlands by directing our efforts where they are likely to be the most effective. If the majority of wetland loss is from illegal activity, for example, then changes to regulations are not likely to effectively reduce losses. Strategies to reduce losses from agriculture, because of agricultural exemptions and the operational practices in agriculture, among other issues, are also likely to be different from strategies to reduce acres filled by commercial developers.

ILLEGAL FILL A SIGNIFICANT PROBLEM

HOW ARE WE DOING?

We have analyzed the data we have collected to determine what the principal causes are and how we can most effectively intervene to better protect wetlands. The most significant finding to date, which has already changed DEP's focus, is that a very large portion of the identified fill was unpermitted. This discovery has resulted in a shift toward compliance and enforcement strategies in our work.

We have also examined the areas of loss to see what types of activities account for the most change. In 2004, agriculture, residential, and commercial activities account for the largest portions of losses identified. Since 2004, we have obtained updated aerial imagery and have preliminary information on the updated causes of wetland loss. While agriculture, commercial and residential development represented about 74% of the wetland loss in 2004, in 2006 they represent only 44% of the loss. The 2005 aerial imagery shows that while commercial and residential development continue to be a large cause of wetland loss at a combined 36%, the loss from agricultural and cranberry bog activities has dropped significantly to approximately 8%. These numbers only represent 80% of the loss in NERO and SERO and do not include CERO or WERO. The analysis is ongoing and is anticipated to be complete in December 2006. Assessing the factors that have contributed to the identified losses will enable DEP to reduce losses in the future.

Wetland Loss from Agriculture dropped from 32% in 2004 to 8% in 2005

In the future, we plan to continue reviewing wetland loss data for all towns, update and automate our permit tracking system and electronically link it to the wetland loss maps so that data is more accessible and those fills that are permitted can be distinguished from those that are illegal [see Improve Wetland Database Integration Summary]. We will update our data regularly with new overflights because wetland loss patterns and causes

may change in the future. The latest statewide aerial photography was obtained in the Spring of 2005. Regular updates are scheduled to occur every 3-5 years.

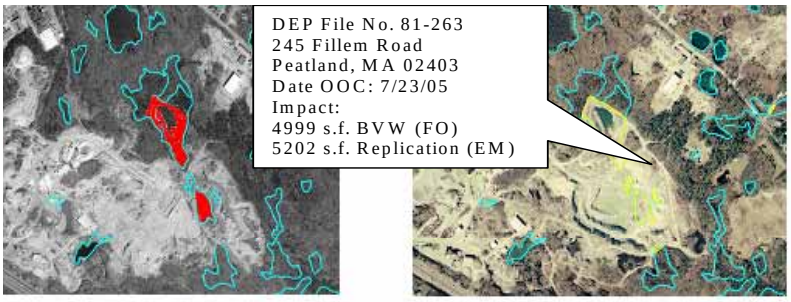
WW_ Improve Wetland Loss Data-Summ-06
FINAL October 2005

PROTECT INTACT FUNCTIONING WETLANDS: IMPROVE WETLAND DATABASE INTEGRATION

INDICATOR: % WETLAND PERMITTING AND ENFORCEMENT DATA ACCESSIBLE FROM WETLAND LOSS MAPS

WHY IS THIS IMPORTANT?

Despite the successes of the Wetlands Change Project as a pilot initiative, the DEP currently faces several challenges in integrating it with the existing permitting and enforcement data and capturing new data so that wetland staff can instantly determine whether a loss site is permitted or has/had an enforcement action on it. This will improve our ability to determine the cause of wetland loss, as well as our ability to determine what action to take. Prompt action is more likely to result in successful wetland restoration where wetlands were illegally filled, or successful wetland replication when constructed areas fail or are never built. Ultimately, improving our wetland loss data can accomplish an overall reduction in wetland loss by deterring illegal filling, encouraging review of permitted activities and by developing compliance strategies.



Example wetland loss maps once permitting data is linked.

HOW ARE WE DOING?

In the spring of 2005, the DEP was the recipient of a three year Wetland Demonstration Program Grant in the amount of $600,000 from the U.S. Environmental Protection Agency (EPA). Most of the monies from this grant, which is being adopted as part of the Program Partnership Agreement (PPA) between DEP and the Environmental Protection Agency (EPA), will go towards achieving the goals of this project. The primary goal of this project is to develop an electronic mapping system that will combine various databases and visually present data compilations of the Massachusetts Wetlands Protection Program so that we can link permitted projects with GIS identified wetland losses and more easily determine which losses are permitted and which are illegal. Existing databases include data from ongoing wetland permitting (WETINFO), eDEP (electronic filing database), enforcement (MADOG currently under development), and the aerial reconnaissance Wetlands Change mapping. The electronic database mapping will also allow the DEP to track and distinguish permitted vs. illegal fill, how much and what type of loss was permitted; and which sites have had enforcement action (or investigation). We will also develop a system to identify and track wetland replication areas associated with permitted projects, restoration areas associated with enforcement actions, and other stand-alone restoration projects to track wetlands gained.

WW_ Protect wetlands functions-Summ-06
FINAL October 2005

INTACT FUNCTIONING WETLANDS: *PROTECT WETLAND FUNCTIONS*

INDICATOR: PERCENT OF STATE MAPPED FOR HABITAT OF POTENTIAL REGIONAL AND STATEWIDE IMPORTANCE

WHY IS THIS IMPORTANT?

We protect wetlands to protect the important functions they provide to us – public and private water supply & groundwater; storm damage prevention and flood control, prevention of pollution, and providing food, shelter, overwintering and nesting/spawning habitat for fisheries, shellfish, and wildlife habitat. Destruction of wetlands also destroys the functions those wetlands serve. But wetlands can also be harmed in many other ways. Fragmentation of wetland can interfere with the wildlife habitat functions of that wetland far more than the few square feet of fill involved would suggest. And wetland functions can be compromised by actions beyond the wetlands themselves– for example, cutting off access to uplands impedes movement through wildlife corridors, increasing stormwater discharge volumes and degrading stormwater quality impair wetlands hydrologic characteristics, or significantly changing lighting, temperature or other characteristics that could affect wildlife habitat. We currently do not have a good overall means to measure changes in wetlands function, but suspect that the acres of wetlands whose functions have been impaired far exceeds the amount of wetlands directly filled.

HOW ARE WE DOING?



At present, we do not have a good measure of the extent to which wetlands serve various functions; nor do we have sound understanding as to what actions most significantly impaired those functions. In consideration of how wetland functions are now incorporated in the Mass DEP wetland regulations, attempts are made to considering wetlands functions in each individual permit decision. Recently, we have improved our protection of wetland functions through new buffer zone regulations that provide incentives for project proponents to keep all disturbance beyond the first 50 feet of buffer associated with each wetland resource area. (March 2005). Also, we have issued guidance on replication of lost wetlands that attempts to ensure that created wetlands better replace the functions of wetlands altered. However, we don't know how effective we are in protecting wetland functions overall.

A complete consideration of wetland functions would be assessed on a watershed basis, to determine what functions are most significant for particular wetlands and therefore which functions and wetlands are most in need of protection. The cumulative impacts of human activity would be evaluated, not only impacts of individual permit requests. In the fall of 2005, the Massachusetts Wildlife Habitat Protection Guidelines for Inland Resource Areas will be published. During the development of the guidance, we adopted the Conservation Assessment and Prioritization System (CAPS) as the approach to

mapping wildlife habitat of potential regional or statewide importance. The CAPS is an objective, dynamic, and flexible tool and approach for assessing the ecological integrity of lands and waters and subsequently identifying and prioritizing land for habitat conservation. CAPS analyses have been completed for 50 communities in the Highlands and Housatonic Regions of Western Massachusetts. Analyses for the rest of the state needs to be completed. The completion of these maps has will serve as a future indicator for the protection of important wetlands and wetland wildlife functions.

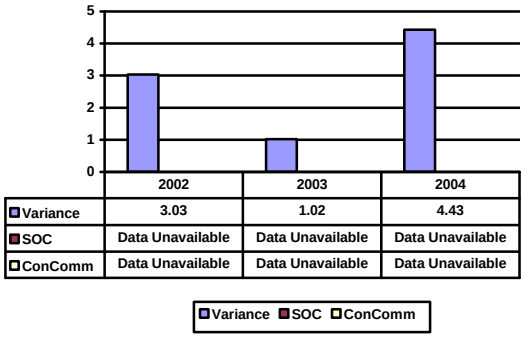
PROTECT INTACT FUNCTIONING WETLANDS: REDUCE PERMITTED WETLAND LOSSES

INDICATOR: TOTAL PERMITTED WETLAND LOSS

WHY IS THIS IMPORTANT?

Recent studies show that illegal fill is likely the largest single cause of direct wetlands loss. However, some wetlands fill is permitted by local conservation commissions and by the state because some activities are exempt from the wetlands rules (e.g. land in agricultural use and utility maintenance and repair), some activities may exceed the limit of fill allowed (e.g. "limited projects" such as roadway improvements and agriculture), and the rules allow up to 5000 s.f. of wetlands alteration when it cannot be avoided. However, in most cases the effects must be minimized, and the acreage and functions of the wetlands replaced. Wetland creation is difficult and expensive, and studies show that attempts to replace lost wetlands functions are often unsuccessful. Therefore, we try to minimize losses, and also work to improve the success of created wetlands where the loss is unavoidable.

DEP Approved Vegetated Wetland Loss by Acre



HOW ARE WE DOING?

We do not have good data on the extent of permitted wetlands losses, because much of the permitting in the state occurs at the local level, and the extent of permitted wetlands alterations is not always provided to DEP. The records that we do have at the state level are primarily paper records and so the data is not easily compiled for the over 8,500 permitting decisions made each year. In our review of 92 towns, we found that about 15% of the acres filled were likely permitted (i.e. about 95 acres). While the amount of unpermitted fill appears to greatly exceed the amount permitted, we need to make sure that permitted fill is minimized, and that wetlands required to be created successfully reproduce the lost wetlands acreage and functions.

To track permitted wetland loss and wetland creation where impacts are unavoidable, we plan to link electronic applications with our wetland loss maps to determine which

alterations are permitted and whether replication areas have been successful. We also plan to use this data to work together with Conservation Commissions to tighten monitoring requirements in permits, and to dramatically increase inspections during construction, post-construction, and prior to issuance of a Certificate of Compliance. We expect that this work will greatly minimize permitted loss of wetlands.

PROTECT INTACT FUNCTIONING WETLANDS: *REDUCE UNPERMITTED WETLAND LOSSES*

INDICATOR: ACRES LOST THROUGH UNPERMITTED ACTIVITY

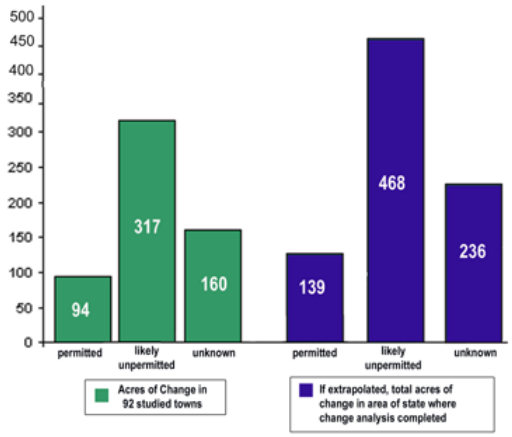
WHY IS THIS IMPORTANT?

The two principal ways MassDEP can protect wetlands are preventing unpermitted losses and carefully controlling permitted losses. Preventing unpermitted losses is particularly important because unpermitted activity – which by definition escapes all review -- can occur in locations and in ways that are particularly damaging to the environment. Unaddressed unpermitted activity can also erode respect for compliance in other segments of the regulated community, as responsible citizens observe other people "getting away with" violations. And we are all too aware that restoring filled wetlands is often very expensive and sometime not possible. Prevention of unpermitted activity is therefore a high priority.

HOW ARE WE DOING?

Based on a sample of 92 towns in Massachusetts, we have estimated that about 58% of the identified historic losses were the result of unpermitted or possibly unpermitted activity[2]. This is considerably more unpermitted loss than we expected to find, given Massachusetts's history of strong wetlands protection. As far as we know, Massachusetts is the only state that has attempted to systematically identify unpermitted fill; if Massachusetts is finding such high rates of unpermitted activity it certainly raises questions about what may be occurring elsewhere in the nation.

DEP PLANS TO REDUCE ACREAGE LOST TO UNPERMITTED ACTIVITY



MassDEP is undertaking a comprehensive enforcement effort to highlight our capability to find unpermitted fill and penalize those responsible. In addition, every effort will be made to publicize our enforcement initiative (including the assessment of heavy penalties and requirements for restoration) in order to serve as a deterrent for others. MassDEP is also making the wetlands loss maps available to communities and the public so that we can all work together toward prevention of unpermitted fill. We have conducted a new overflight of the state in April 2005 to measure the extent of unpermitted fill at that time, as a first measure of our effectiveness in reducing the

[2] While the sample of towns was not selected randomly and we cannot confidently extrapolate this data to the entire state, we believe the percentage of likely unpermitted activity found in the sample is likely representative of statewide conditions.

destruction of wetlands. We expect that analysis to be done by the fall of 2006. With renewed efforts to integrate assorted wetland databases, combined with the introduction of electronic applications, we will be developing a link between permits issued and wetland losses identified on our maps. We expect that this will increase our ability to quickly distinguish those fills that are unpermitted from those that are permitted (see Improve Wetland Database Integration Summary).